Mesocyclone Rapid Update Requirements
ORPG Build 4 – AWIPS OB2

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ORPG Build 4 WSR-88D MRU Product Functional Requirements

- **The Mesocyclone Rapid Update (MRU) product is generated once per elevation scan**
- **Mesocyclone Algorithm information from an elevation scan is based on elevations that have been completed thus far in the current volume scan**
- **This information is combined with the previous volume scan Mesocyclone and Storm Track Algorithm information**
- **Average motion of all SCIT cells from the previous volume is used to derive forecast positions of previous features at the current volume scan time**
- **In feature type order, the forecast position of each previous feature is matched to the closest current feature within a search radius defined by SCIT algorithm**
  - Current unmatched 3D features are New
  - If previous volume is unavailable, all features are New

ORPG Build 4 WSR-88D MRU Product Functional Requirements(cont.)

- **Current features inherit attributes (associated storm ID, feature type, maximum tangential shear and the diameters and height of this shear, top height, base azimuth, base range, base height) of the matched previous feature**
  - Position attributes (base azimuth, range, and height) of matched previous features are updated to the "current" detection
    - Top height is updated if the top of the current detection is taller
  - Position attributes (base azimuth and range only) of unmatched previous features are extrapolated to the forecast position
  - Strength attributes (feature type, maximum tangential shear) are updated to the "current" value, if increasing in magnitude.
    - The radial/azimuthal diameters and height of the maximum shear are also updated if the max tangential shear increases
- **Feature status categories are persistent, increasing, new, and extrapolated**
- **At the end of the volume scan extrapolated features are removed**

ORPG Build 4 WSR-88D MRU Product Functional Requirements(concluded)

- **Product is used to generate a graphic display, graphic overlay to other products, and alphanumeric displays**
- **Product includes annotations for the product name, date and time of volume scan, and elevation angle**
- **Product format requirements**
  - Graphic 3D feature symbols
    - 3D features that are new, persistent, increasing, or extrapolated
    - Packet #20 to report current (new, persistent, & increasing) and extrapolated mesocyclone and 3-D correlated shears features
    - Identify storm ID associated with each mesocyclone
  - Graphic alphanumeric table
    - 3D features that are new, persistent, increasing, or extrapolated
    - Display character ^ (8-bit hexadecimal 5E) next to current data
  - Tabular alphanumeric table
    - 3D features that are new, persistent, increasing, or extrapolated
    - Increasing, persistent, and extrapolated 2D features
    - Display character ^ (8-bit hexadecimal 5E) next to current data

MRU Product Template

```
    The GAB is composed of 5 rows of information for each feature.  There
    are 6 features displayed per page like this:

         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890

 STATUS/ID  XXX / XX  XXX / XX  XXX / XX  XXX / XX  XXX / XX  XXX / XX
   FEATURE  XXXXXXX^  XXXXXXX^  XXXXXXX^  XXXXXXX^  XXXXXXX^  XXXXXXX^
  AZ   RAN XXX ^ XXX XXX ^ XXX XXX ^ XXX XXX ^ XXX XXX ^ XXX XXX ^ XXX
  BASE TOP XX.X^XX.X XX.X^XX.X XX.X^XX.X XX.X^XX.X XX.X^XX.X XX.X^XX.X
 RAD AZDIA XX.X^XX.X XX.X^XX.X XX.X^XX.X XX.X^XX.X XX.X^XX.X XX.X^XX.X

Note:  The above template does not show the lines drawn between the rows
       and columns of the GAB.
*******************************************************************************/
```

```
/*******************************************************************************

   The following was used as a template for the meso rapid update TAB:

         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890

                          MESOCYCLONE RAPID UPDATE
      RADAR ID: nnn     DATE: mm/dd/yy   TIME: hh:mm:ss   ELEV: xx.x deg

 FEATURE   STORM  FEATURE     BASE     TOP     AZRAN      HGT     DIAM(NM)      SHEAR
  STATUS     ID     TYPE       kft      kft     deg-nm     kft     RAD   AZ     (e-3/s)

    NNN   -   CC   CCCCCCC^   NN.N^   NN.N^  NNN/NNN^  NN.N^  NN.N  NN.N^    NNN^

*******************************************************************************/
```

MRU Product Format Examples

Graphic Attributes Table (example in blue)

STATUS/ID	EXT / C0		PER / C0		INC / D0		INC / D0	
FEATURE	MESO		MESO		MESO		MESO	^
AZ RAN	241	53	245 ^	57	275 ^	37	270 ^	39
BASE TOP	4.6	25.6	11.0^	21.9	10.3^	17.2	22.8	26.2
RAD AZDIA	8.5	4.3	1.6	3.2	1.5^	2.1	2.2	2.3
EXAMPLES	*Extrapolated*		*Matched*		*Increased Shear*		*Increased Type*	

Tabular Alphanumeric Product (example in blue)

MESOCYCLONE RAPID UPDATE

RADAR ID: 302 DATE: 05/03/99 TIME: 22:19:08 ELEV: 6.0 deg

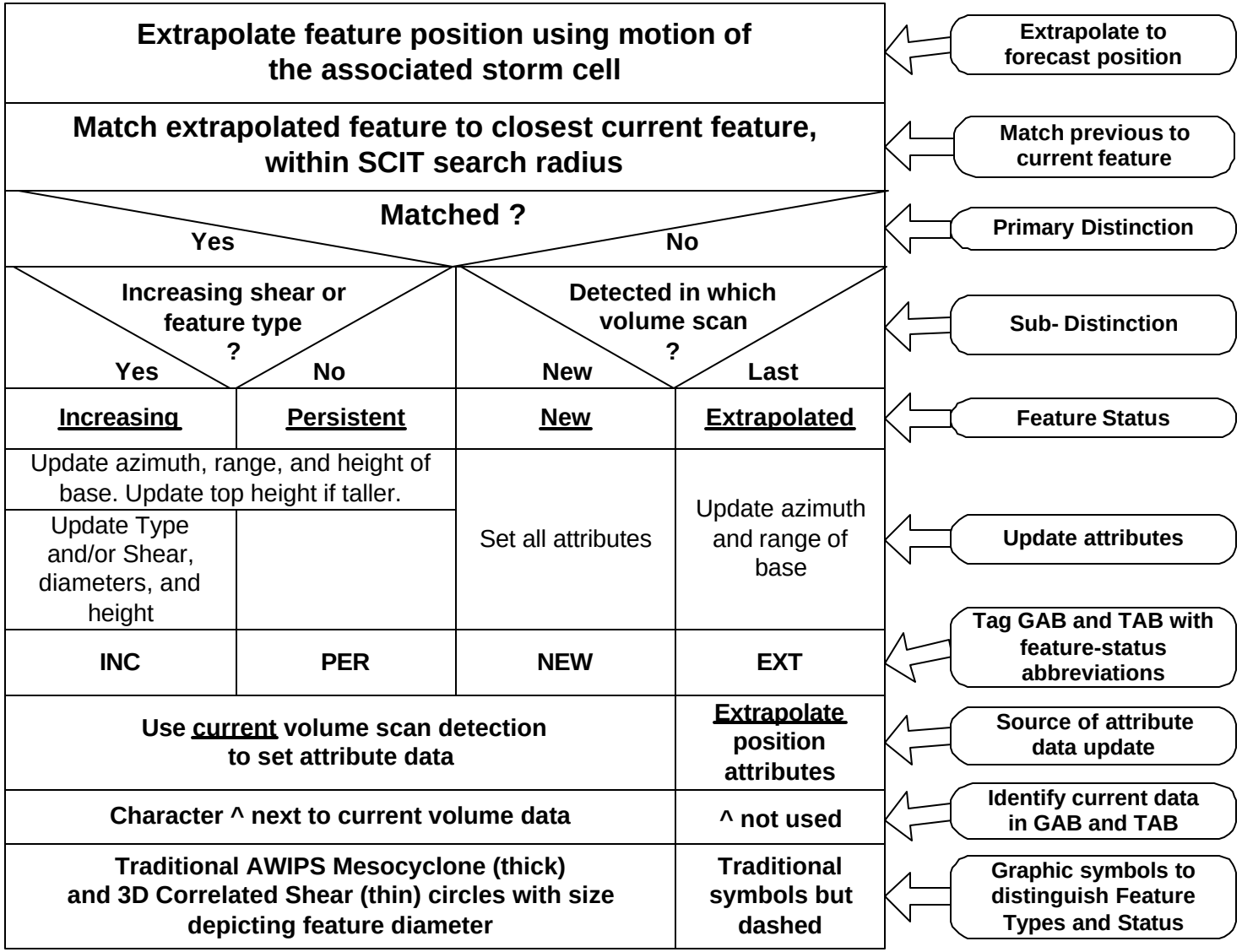
FEATURE STATUS		STORM ID	FEATURE TYPE	BASE kft	TOP kft	AZRAN deg-nm	HGT kft	DIAM(NM) RAD	DIAM(NM) AZ	SHEAR (E-3/S)	*EXAMPLES*
EXT	-	C0	MESO	4.6	25.6	241/ 53	25.6	8.5	4.3	35	*Extrapolated(unmatched)*
PER	-	C0	MESO	11.0^	21.9	245/ 57^	11.0	1.6	3.2	31	*Matched (not increasing)*
INC	-	D0	MESO	10.3^	17.2	275/ 37^	17.2^	1.5^	2.1	13^	*Increasing shear*
INC	-	D0	MESO ^	22.8^	26.2	270/ 39^	26.2^	2.2	2.3	15	*Increasing type*
NEW	-	D0	3DC SHR^	23.6^	23.6^	257/103^	23.6^	6.1^	11.9	6^	*New*
EXT	-	B0	UNC SHR	13.6	13.6	264/ 48	13.6	2.2	2.5	8	*Extrapolated(unmatched)*

Product Symbology Block (proposed packet definition)

Feature	Packet	Point Feature Type: Extrapolated	Point Feature Type: Current
Mesocyclone	20	1	3
Correlated Shear	20	2	4
Storm Cell ID	15		

12/17/02

MRU Overview and Terminology



AWIPS OB2 Functional Requirements

- **Mesocyclone Rapid Update (ORPG Build 4 generates new elevation based product, based on user request)**
  - User requests the MRU product three different ways
    - All elevations, lowest x elevations, specific elevation angles
  - Can archive and read-back all MRU products
  - Display as overlay to other products from same volume scan
  - User option to choose between displaying the latest elevation (i.e., highest elevation) and displaying a specific elevation
  - When the latest elevation is selected, the display will automatically update when higher elevation products are received
  - Highest elevation MRU is used as overlay in time loops
  - Negative condition (no features) must be displayed
  - Annotate displays with elevation angle of the MRU product

AWIPS OB2 Functional Requirements

- **Mesocyclone Rapid Update D2D display requirements**
  - Graphic display of 3D feature icons
    - Display traditional AWIPS mesocyclone and 3-D correlated shear symbols for current and use dashed symbols for extrapolated features
    - Toggle to turn off display of extrapolated features
  - Graphic alphanumeric table (grid/text D2D display)
    - Display like other graphic alphanumeric products
  - Tabular alphanumeric table (AWIPS text viewer)
    - Display like other tabular alphanumeric products